GREAT LAKES INDIAN FISH & WILDLIFE COMMISSION
P. O. Box 9 • Odanah, WI 54861 • 715/682-6619 • FAX 715/682-9294

• MEMBER TRIBES •

MICHIGAN	WISCONSIN		MINNESOTA
Bay Mills Community	Bad River Band	Red Cliff Band	Fond du Lac Band
Keweenaw Bay Community	Lac Courte Oreilles Band	St. Croix Chippewa	Mille Lacs Band
Lac Vieux Desert Band	Lac du Flambeau Band	Sokaogon Chippewa	

October 14, 2015

Michael Jimenez
Minerals NEPA Project Manager
Superior National Forest
8901 Grand Avenue Place
Duluth, MN 55808

Mr. Jimenez,

Enclosed please find a wetland ecosystem valuation assessment of the NorthMet mine site. The Great Lakes Indian Fish and Wildlife Commission (GLIFWC) is an intertribal agency exercising delegated authority from 11 federally recognized Ojibwe (or Chippewa) tribes in Wisconsin, Michigan and Minnesota.[1] Those tribes have reserved hunting, fishing and gathering rights in territories ceded in various treaties with the United States. GLIFWC's mission is to assist its member tribes in the conservation and management of natural resources and to protect habitats and ecosystems that support those resources.

As you know, the proposed NorthMet mine is located within the territory ceded in the Treaty of 1854. GLIFWC member tribes have expressed concern about the potential impacts of sulfide mining, whether those impacts occur within the 1854 ceded territory, in the 1842 ceded territory, which includes portions of Lake Superior, or the 1837 ceded territory. The following comments are submitted by GLIFWC staff with the explicit understanding that each GLIFWC member tribe or any other tribe may choose to submit comments from its own perspective.

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[1] GLIFWC member tribes are: in Wisconsin -- the Bad River Band of the Lake Superior Tribe of Chippewa Indians, Lac du Flambeau Band of Lake Superior Chippewa Indians, Lac Courte Oreilles Band of Lake Superior Chippewa Indians, St. Croix Chippewa Indians of Wisconsin, Sokaogon Chippewa Community of the Mole Lake Band, and Red Cliff Band of Lake Superior Chippewa Indians; in Minnesota -- Fond du Lac Chippewa Tribe, and Mille Lacs Band of Chippewa Indians; and in Michigan -- Bay Mills Indian Community, Keweenaw Bay Indian Community, and Lac Vieux Desert Band of Lake Superior Chippewa Indians.

A comprehensive ecosystem valuation report is available for the St. Louis River watershed (Fletcher, 2015, The Value of Nature's Benefits in the St. Louis River Watershed. Earth Economics, Tacoma WA). This report, which thus far has not been used in the National Environmental Policy Act (NEPA) process for the NorthMet project, establishes baseline values for natural capital in the areas of the proposed land exchange. In comments submitted as part of the Pre-Final Environmental Impact Statement (PFEIS) review, GLIFWC staff noted that the PFEIS did not account for natural capital and ecosystem services that would be lost to the St. Louis River watershed if the NorthMet project land exchange were approved. Specifically, the ecosystem services provided by wetlands would be lost to the St. Louis River watershed because the majority of lands that would enter the federal estate if the proposed land exchange is approved are located outside of the St. Louis River watershed (Figure 1). Furthermore, the ecosystem values that these wetlands are currently providing to the St. Louis River watershed are not systematically assessed in the PFEIS. This process is critical in determining adequate wetland mitigation is provided for the public good.

GLIFWC staff used the information in the Ecosystem Valuation Report for the St Louis River watershed (Table 1) to characterize the losses in ecosystem services to the watershed as a result of the land exchange and the NorthMet mine. The analysis of direct impacts includes wetlands filled at both the mine and plant sites. The analysis of indirect wetland impact focuses on the mine site of the proposed project which is the area of the proposed land exchange and does not include indirect wetland impacts at the plant site.

The NorthMet project would directly impact approximately 913 acres of wetlands at the mine site and the loss of ecosystem services will not be mitigated in the watershed. Direct impacts of the proposed project will result in a loss of $1,358,089 to $5,134,185 per year in wetland ecosystem services (Table 2). Over the 20 year life of the proposed project the St. Louis River watershed would lose between $27,161,780 and $102,683,700 in ecosystem services. The economic loss greatly increases over the hundreds of years that water treatment, wetland monitoring and surface and groundwater capture system operations would be needed at the mine site.

The PFEIS does not include an assessment of indirect impacts to wetlands from the project. The information in the NEPA document is only used to identify monitoring locations. Therefore, GLIFWC staff used the indirect wetland impact analysis in Appendix C of the SDEIS to estimate the economic impact of the proposed project. The analysis presents the monetary loss of wetland ecosystem services in dollars per acre per year.

For indirect wetland impacts, the mine site was divided into impact zones (Figure 2). Zone 1 could lose between $4,752,615 and $17,920,694 per year in wetland ecosystem services (Table 3). Zone 2 could lose between $5,301,242 and $20,025,269 per year in wetland ecosystem services (Table 4). Zone 3 could lose between $24,467,339 and $92,581,367 per year in wetland ecosystem services (Table 5). Zone 4 could lose between $16,608,913 and $60,058,732 per year in wetland ecosystem services (Table 6).

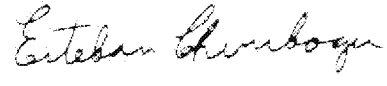
The valuation of indirect wetland impacts presented above is the worst case scenario. This is because the indirectly impacted wetlands are likely to retain an undetermined percentage of their functions and values. The GLIFWC analysis of indirect impacts in Appendix C of the SDEIS indicates that severe impacts are expected to 3,188 acres in Zone 1. Severe to Moderate impacts are expected to 3,632 acres in Zone 2; and severe to moderate impacts are expected to 16,433 acres in Zone 3. A detailed analysis of ecosystem services on these wetlands is needed to reduce the range in the estimated economic impacts above. Nevertheless, the economic consequences of indirect wetland impacts are substantial and should be quantified by regulatory agencies before the proposed project is permitted.

Wetlands also provide carbon sequestration services that mitigate climate change. Wetland fill and impacts to functions and values eliminate or reduce the ability of a wetland to sequester carbon. The Ecosystem Valuation report for the St. Louis River watershed provides information that permits the calculation of the economic value of this carbon sequestration activity. Wetlands in the Mine Site exchange area that would be directly impacted provide between $30,289,363 and $44,666,818 in economic value over the next 140 years assuming a 2% discount rate (Table 7). This economic impact is in addition to the aquatic impacts described in the previous paragraph.

The economic consequences of the proposed NorthMet project on the goods and services provided by wetlands have not been described in any way by the NEPA process. GLIFWC staff have taken the first step by estimating the ecosystem values of potentially impacted wetlands. This analysis illustrates the importance of healthy ecosystems in the socioeconomic future of the region. Therefore the Forest Service must require a complete assessment of the economic implications of the proposed project and the proposed land exchange if it is to adequately protect the public interest.

Please do not hesitate to contact me at 608-263-2873 or Jim Thannum at 715-682-6619 with any questions.

Sincerely,



Esteban Chiriboga
GLIFWC Environmental Specialist

cc. Tamara Cameron, Chief, Regulatory Branch, Army Corps
Nancy Schuldt, Fond du Lac Water Projects Coordinator
Mike Sedlacek, USEPA Region 5
Neil Kmiecik, GLIFWC Biological Services Director
Ann McCammon Soltis, GLIFWC Intergovernmental Affairs Director
Lisa Fay, Project Manager, MNDNR

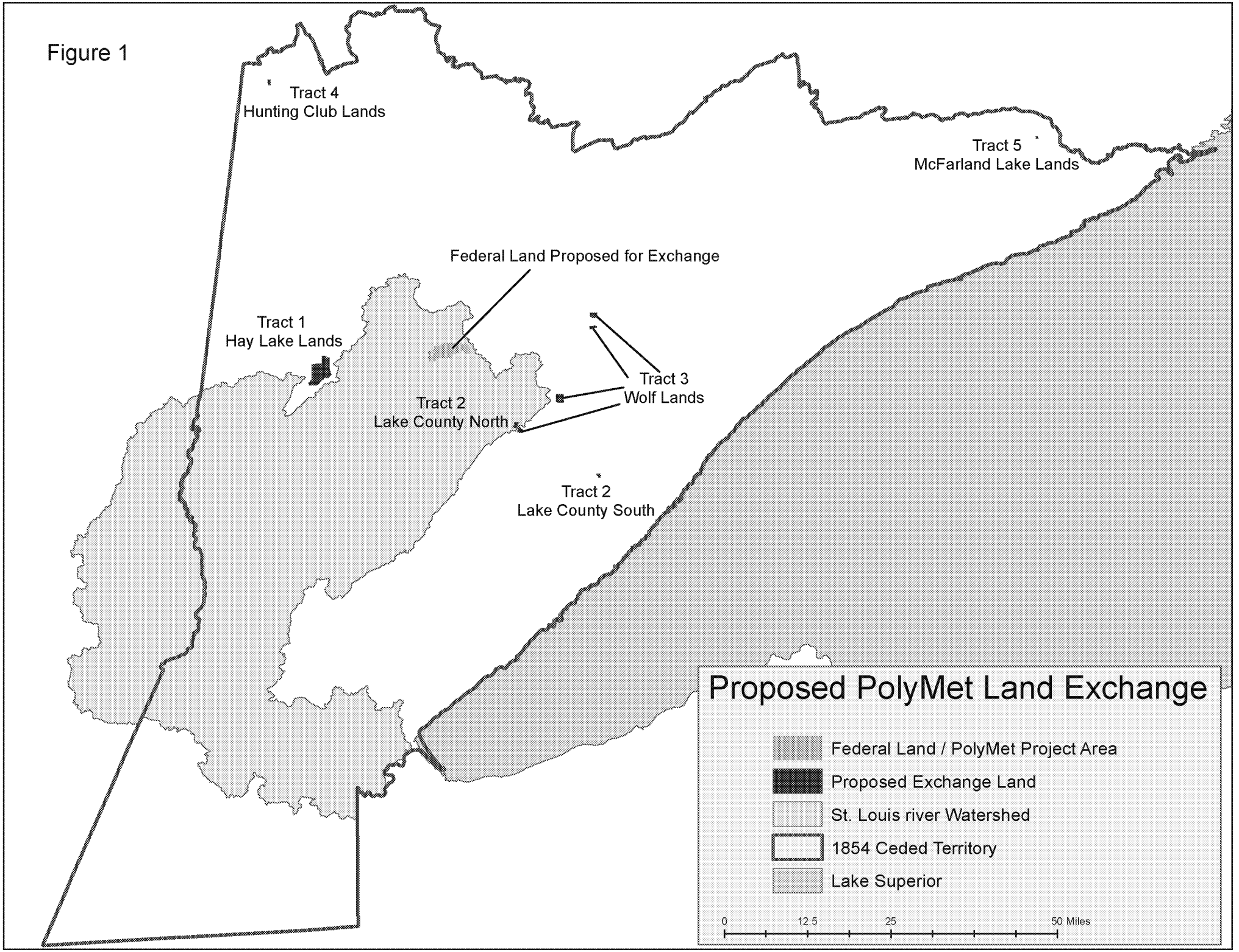
Table 1. Earth Economics Ecosystem Service Values (Table 12) - Pg. 62

LAND COVER	Spatial Attribute		Low ($/acre/year)	High ($/acre/year)
	Riparian	Urban		
Lake			27,642	72,513
Coniferous Forest			1,710	2,776
	X		665	4,040
		X	7,425	11,491
	X	X	7,424	11,489
Herbaceous Wetland			1,471	5,603
	X		1,506	5,604
		X	1,199	11,270
	X	X	3,623	9,337
Shrub Wetland			1,493	5,625
	X		1,378	5,229
		X	1,221	11,185
	X	X	3,645	9,359
Woody Wetland			1,469	5,604
	X		1,354	5,208
		X	1,197	11,164
	X	X	3,621	9338

Riparian $/acre/year values selected in blue font for each given land cover at the proposed PolyMet mine.

Non-Riparian $/acre/year values selected in green font for each given land cover at the proposed PolyMet mine.

Figure 1


Tract 4
Hunting Club Lands
Tract 5
McFarland Lake Lands
Federal Land Proposed for Exchange
Tract 1
Hay Lake Lands
Tract 3
Wolf Lands
Tract 2
Lake County North
Tract 2
Lake County South
Proposed PolyMet Land Exchange
Federal Land / PolyMet Project Area
Proposed Exchange Land
St. Louis river Watershed
1854 Ceded Territory
Lake Superior
0
12.5
25
50 Miles

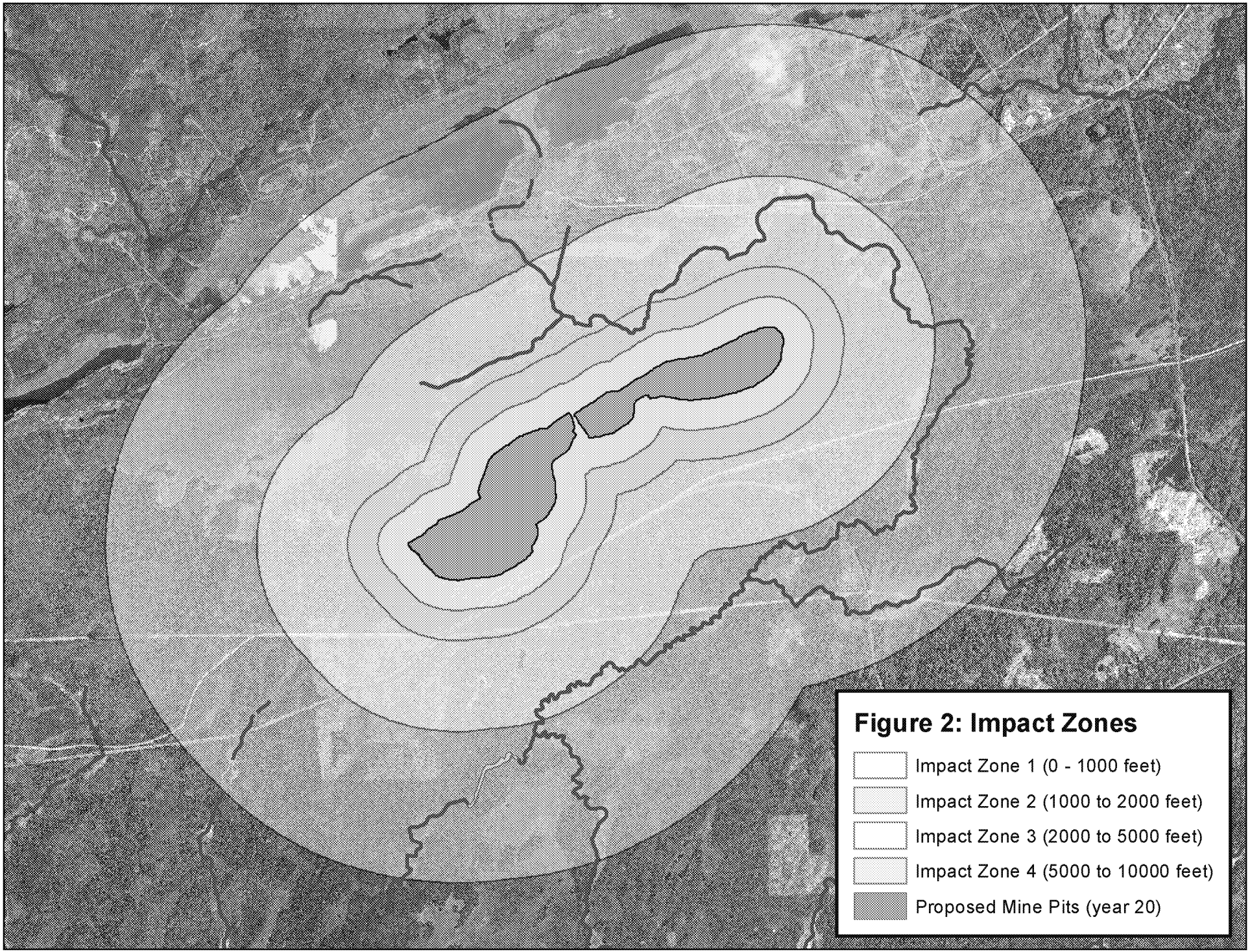


Figure 2: Impact Zones
Impact Zone 1 (0 - 1000 feet)
Impact Zone 2 (1000 to 2000 feet)
Impact Zone 3 (2000 to 5000 feet)
Impact Zone 4 (5000 to 10000 feet)
Proposed Mine Pits (year 20)

Table 2. Direct Wetland Values

UNIQUE ID	ID EGGERS & REED CLASS	ACRES IMPACT	IMPACT	Riparian Area - Acres	Non-Riparian Area - Acres	Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- Low ($/acre/year)	Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- High ($/acre/year)	Riparian Acres - Calculated Low Value ($/year)	Riparian Acres - Calculated High Value ($/year)	Non- Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- Low ($/acre/year)	Non- Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- High ($/acre/year)	Non- Riparian Acres -Calculated Low Value ($/year)	Non- Riparian Acres -Calculated High Value ($/year)	TOTAL ACRES - Calculated Low Value ($/year)	TOTAL ACRES - Calculated High Value ($/year)
	Open water	**0**		0	0	$27,642	$72,513	$0	$0					**$0**	**$0**
	Evergreen Forest	**0**		0	0	$665	$4,040	$0	$0	$1,710	$2,776	$ -	$ -	**$0**	**$0**
	Deep marsh	**73.10**	Wetland eliminated	0.00	73.10										
	Shallow marsh	**73.10**	Wetland eliminated	0.00	73.10										
	Sedge Meadow	**36.55**	Wetland eliminated	0.00	36.55										
	Palustrine Emergent Wetland	**182.76**		-	182.76	$1,506	$5,604	$0	$0	$1,471	$5,603	$ 268,839.96	$ 1,024,004.28	**$268,840**	**$1,024,004**
	Alder thicket or Shrub-carr	**118.79**	Wetland eliminated	0.00	118.79										
	Coniferous bog	**511.73**	Wetland eliminated	0.00	511.73										
	Open bog	**9.14**	Wetland eliminated	0.00	9.14										
	Palustrine Scrub/Shrub Wetland	**639.66**		-	639.66	$1,378	$5,229	$0	$0	*$1,493*	*$5,625*	$ 955,012.38	$ 3,598,087.50	**$955,012**	**$3,598,088**
	Coniferous swamp	**82.24**	Wetland eliminated	0.00	82.24										
	Hardwood swamp	**9.14**	Wetland eliminated	0.00	9.14										
	Palustrine Forested Wetland	**91.38**		0.00	91.38	$1,354	$5,208	$0	$0	$1,469	$5,604	$ 134,237.22	$ 512,093.52	**$134,237**	**$512,094**
TOTAL		**913.80**		-	**913.80**			-	-			**1,358,089.56**	**5,134,185.30**	**1,358,089.56**	**5,134,185.30**

Table 3. Zone 1 Impacts and Values (0-1000 feet)

UNIQUE ID	ID EGGERS & REED CLASS	ACRES IMPACT	IMPACT	DESCRIPTION	Riparian Area - Acres	Non-Riparian Area - Acres	Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- Low ($/acre/year)	Riparian Areas -Ecosystem Service Values (Table 12) - Pg. 62- High ($/acre/year)	Riparian Acres -Calculated Low Value ($/year)	Riparian Acres - Calculated High Value ($/year)	Non-Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- Low ($/acre/year)	Non-Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- High ($/acre/year)	Non-Riparian Acres -Calculated Low Value ($/year)	Non-Riparian Acres -Calculated High Value ($/year)	TOTAL ACRES - Calculated Low Value ($/year)	TOTAL ACRES - Calculated High Value ($/year)
	Open water	**0.00**			0.00	0.00	$27,642.00	$72,513.00	$0.00	$0.00					**$0.00**	**$0.00**
	Evergreen Forest	**0.00**			0.00	0.00	$665.00	$4,040.00	$0.00	$0.00	$1,710.00	$2,776.00	$0.00	$0.00	**$0.00**	**$0.00**
13	Deep marsh	**54.14**	Severe	Conversion of wetland type	0.00	54.14										
20	Sedge meadow	**2.24**	Severe	Conversion to upland	0.00	2.24										
107B	Shallow marsh	27.92	Severe	Conversion of wetland type												
9	Shallow marsh	19.42	Severe	Conversion of wetland type												
	Subtotal Shallow marsh	**47.35**	Severe	**Conversion of wetland type**	0.00	47.35										
	Palustrine Emergent Wetland	**103.72**			0.00	103.72	$1,506.00	$5,604.00	$0.00	$0.00	$1,471.06	$5,603.00	$152,575.06	$581,154.37	**$152,575.06**	**$581,154.37**
24	Alder thicket	5.92	Severe	Conversion of wetland type												
33A	Alder thicket	142.93	Severe	Conversion of wetland type												
43	Alder thicket	7.46	Severe	Conversion of wetland type												
44	Alder thicket	14.70	Severe	Conversion of wetland type												
45	Alder thicket	159.90	Severe	Conversion of wetland type												
51	Alder thicket	5.54	Severe	Conversion of wetland type												
52	Alder thicket	18.11	Severe	Conversion of wetland type												
53D	Alder thicket	39.38	Severe	Conversion of wetland type												
	Subtotal Alder thicket	**393.94**	**Severe**	**Conversion of wetland type**	0.00	393.94										
106	Coniferous bog	981.69	Severe	Possible conversion of wetland type												
101	Coniferous bog	60.63	Severe	Possible conversion of wetland type												
103	Coniferous bog	174.58	Severe	Possible conversion of wetland type												
107	Coniferous bog	126.24	Severe	Possible conversion of wetland type												
25	Coniferous bog	20.97	Severe	Possible conversion of wetland type												
32	Coniferous bog	73.75	Severe	Possible conversion of wetland type												
48	Coniferous bog	190.99	Severe	Possible conversion of wetland type												
62	Coniferous bog	1.78	Severe	Possible conversion of wetland type												
76	Coniferous bog	22.18	Severe	Possible conversion of wetland type												
77	Coniferous bog	118.32	Severe	Possible conversion of wetland type												
79	Coniferous bog	25.71	Severe	Possible conversion of wetland type												
82	Coniferous bog	44.29	Severe	Possible conversion of wetland type												
888	Coniferous bog	12.48	Severe	Possible conversion of wetland type												
90	Coniferous bog	499.82	Severe	Possible conversion of wetland type												
96	Coniferous bog	52.28	Severe	Possible conversion of wetland type												
97	Coniferous bog	32.90	Severe	Possible conversion of wetland type												
99	Coniferous bog	14.54	Severe	Possible conversion of wetland type												
	Subtotal Coniferous bog	**2,453.14**	**Severe**	**Possible conversion of wetland type**	0.00	2,453.14										
	Palustrine Scrub/Shrub Wetland	**2,847.08**			0.00	2,847.08	$1,378	$5,229	$0	$0	$1,493	$5,425	$4,250,684	$16,014,893	**$4,250,684**	**$16,014,893**
107A	Coniferous swamp	3.09	Severe	Change in vegetation												
33B	Coniferous swamp	47.69	Severe	Change in vegetation												
68	Coniferous swamp	172.13	Severe	Change in vegetation												
72	Coniferous swamp	14.91	Severe	Change in vegetation												
	Subtotal Coniferous swamp	**237.82**	**Severe**	**Change in vegetation**	0.00	237.82										
	Palustrine Forested Wetland	**237.82**			0.00	237.82	$1,364	$5,208	$0	$0	$1,469	$5,604	$349,356	$1,332,738	**$349,356**	**$1,332,738**
TOTAL		**3,188.62**			**0.00**	**3,188.62**			**0.00**	**0.00**			**4,752,615.64**	**17,928,694.54**	**4,752,615.64**	**17,928,694.54**

Table 4. Zone 2 Impacts and Values (1000 feet-2000 feet)

UNIQUE ID	ID ECODES & REED CLASS	ACRES IMPACT	IMPACT	DESCRIPTION	Riparian Area - Acres	Non-Riparian Area - Acres	Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- Low ($/acre/year)	Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- High ($/acre/year)	Riparian Acres - Calculated Low Value ($/year)	Riparian Acres - Calculated High Value ($/year)	Non- Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- Low ($/acre/year)	Non- Riparian Areas - Ecosystem Service Values (Table 12) - Pg. 62- High ($/acre/year)	Non- Riparian Acres - Calculated Low Value ($/year)	Non- Riparian Acres - Calculated High Value ($/year)	TOTAL ACRES - Calculated Low Value ($/year)	TOTAL ACRES - Calculated High Value ($/year)
	Open water	**0**			0.00	0.00	$27,642	$72,513	$0	$0					**$0**	**$0**
	Evergreen Forest	**0**			0.00	0.00	$665	$4,840	$0	$0	$1,718	$2,776	$0	$0	**$0**	**$0**
22B	Shallow marsh	29.19	Severe	Conversion of wetland type												
16	Shallow marsh	3.317	Severe	Conversion of wetland type												
22	Shallow marsh	15.372	Severe	Conversion of wetland type												
	Subtotal Shallow Marsh	**47.879**			0.00	47.88										
	Palustrine Emergent Wetland	**47.879**			0.00	47.88	$1,586	$5,604	$0	$0	$1,471	$5,683	$70,430	$268,266	**$70,430**	**$268,266**
100A	Alder thicket	8.275	Moderate to Severe	Change in vegetation to change in wetland type												
53D	Alder thicket	802.66	Moderate to Severe	Change in vegetation to change in wetland type												
43	Alder thicket	9.15	Moderate to Severe	Change in vegetation to change in wetland type												
53	Alder thicket	15.967	Moderate to Severe	Change in vegetation to change in wetland type												
100A	Alder thicket	8.21	Moderate to Severe	Change in vegetation to change in wetland type												
22C	Alder thicket or Shrub-carr	30.447	Moderate to Severe	Change in vegetation to change in wetland type												
315	Alder thicket or Shrub-carr	185.118	Moderate to Severe	Change in vegetation to change in wetland type												
	Subtotal Alder thicket	**1059.827**			74.98	984.93										
108	Coniferous bog	49.041	Severe	Possible conversion of wetland type												
48	Coniferous bog	556.958	Severe	Possible conversion of wetland type												
62	Coniferous bog	108.797	Severe	Possible conversion of wetland type												
80	Coniferous bog	3.138	Severe	Possible conversion of wetland type												
26	Coniferous bog	4.866	Severe	Possible conversion of wetland type												
88	Coniferous bog	14.561	Severe	Possible conversion of wetland type												
149	Coniferous bog	105.174	Severe	Possible conversion of wetland type												
104	Coniferous bog	4.747	Severe	Possible conversion of wetland type												
98	Coniferous bog	383.229	Severe	Possible conversion of wetland type												
773	Coniferous bog	53.424	Severe	Possible conversion of wetland type												
928	Coniferous bog	940.711	Severe	Possible conversion of wetland type												
77	Coniferous bog	20.517	Severe	Possible conversion of wetland type												
552	Coniferous bog	31.21	Severe	Possible conversion of wetland type												
	Subtotal Coniferous bog	**2,276.37**			940.70	1335.67										
47	Open bog	2.341	Severe	Change in vegetation to change in wetland type												
50A	Open bog	78.35	Severe	Change in vegetation to change in wetland type												
	Subtotal Open bog	**80.691**	Severe	**Possible conversion of wetland type**	0.00	$0.69										
	Palustrine Scrub/Shrub Wetland	**3,416.89**			1015.60	2401.29	$1,378	$5,229	$1,399,497	$5,310,572	$1,493	$5,625	$3,585,127	$13,587,262	**$4,984,624**	**$18,817,834**
61	Coniferous swamp	3.727	Moderate to Severe	Possible changes in vegetation												
701	Coniferous swamp	3.968	Moderate to Severe	Possible changes in vegetation												
856	Coniferous swamp	74.335	Moderate to Severe	Possible changes in vegetation												
72A	Coniferous swamp	9.564	Moderate to Severe	Possible changes in vegetation												
53C	Coniferous swamp	28.741	Moderate to Severe	Possible changes in vegetation												
98A	Coniferous swamp	7.821	Moderate to Severe	Possible changes in vegetation												
57	Coniferous swamp	36.143	Moderate to Severe	Possible changes in vegetation												
	Coniferous swamp Sub	**164.299**	Moderate to Severe	**Possible changes in vegetation**	0.00	164.30										
64	**Hardwood swamp**	**3.29**	Moderate to Severe	**Change in vegetation to change in wetland type**	0.00	3.29										
	Palustrine Forested Wetland	**167.59**			0.00	167.59	$1,354	$5,208	$0	$0	$1,469	$5,604	$246,188	$939,169	**$246,188**	**$939,169**
TOTAL		**3,632.36**			**1,015.60**	**2,616.76**			**1,399,496.80**	**5,310,572.40**			**3,901,745.71**	**14,714,696.67**	**5,301,242.51**	**20,025,269.07**

Table 5. Zone 3 Impacts and Value (2000 - 5000 feet)

UNIQUE ID	ID EGGERS & REED CLASS	ACRES IMPACT	IMPACT	DESCRIPTION	Riparian Area - Acres	Non-Riparian Area - Acres	Riparian Areas - Values (Table 12) - Pg. 62- Low ($/acre/year)	Riparian Areas -Values (Table 12) - Pg. 62- High ($/acre/year)	Riparian Acres -Calculated Low Value ($/year)	Riparian Acres - Calculated High Value ($/year)	Non-Riparian Areas -Values (Table 12) - Pg. 62- Low ($/acre/year)	Non-Riparian Areas -Values (Table 12) - Pg. 62- High ($/acre/year)	Non-Riparian Acres - Calculated Low Value ($/year)	Non-Riparian Acres - Calculated High Value ($/year)	TOTAL ACRES - Calculated Low Value ($/year)	TOTAL ACRES -Calculated High Value ($/year)
	Open water	**0**			0	0	$27,642	$72,513	$0	$0					**$0**	**$0**
	Evergreen Forest	**0**			0	0	$665	$4,048	$0	$0	$1,710	$2,776	$0	$0	**$0**	**$0**
	Shallow Marsh	**374.9**			374.99											
	Palustrine Emergent Wetland	**374.9**			374.99	0.00	$1,506	$5,604	$564,599	$2,100,940	$1,473	$5,603	$0	$0	**$564,599**	**$2,100,940**
53	Alder thicket	184.092	Moderate	Change in vegetation												
53D	Alder thicket	714.287	Moderate	Change in vegetation												
54B	Alder thicket	6.04	Moderate	Change in vegetation												
54C	Alder thicket	8.015	Moderate	Change in vegetation												
58	Alder thicket	372.266	Moderate	Change in vegetation												
53D	Alder thicket	1283.309	Moderate	Change in vegetation												
55	Alder thicket	15.732	Moderate	Change in vegetation												
678	Alder thicket	1.676	Moderate	Change in vegetation												
743	Alder thicket	4.75	Moderate	Change in vegetation												
744	Alder thicket	10.344	Moderate	Change in vegetation												
746	Alder thicket	3.572	Moderate	Change in vegetation												
747	Alder thicket	10.027	Moderate	Change in vegetation												
749	Alder thicket	99.326	Moderate	Change in vegetation												
752	Alder thicket	36.908	Moderate	Change in vegetation												
	Subtotal Alder thicket	**2,750.344**														
315	Alder thicket or Shrub-carr	2907.52	Moderate	Change in vegetation												
565	Alder thicket or Shrub-carr	20.622	Moderate	Change in vegetation												
566	Alder thicket or Shrub-carr	63.204	Moderate	Change in vegetation												
480	Alder thicket or Shrub-carr	47.863	Moderate	Change in vegetation												
555	Alder thicket or Shrub-carr	61.723	Moderate	Change in vegetation												
557	Alder thicket or Shrub-carr	31.464	Moderate	Change in vegetation												
890	Alder thicket or Shrub-carr	157.349	Moderate	Change in vegetation												
	Subtotal Alder thicket or Shrub-carr	**3289.745**														
	TOTAL ALDER THICKET/SHRUB CARR	**6,040.09**			1,650.68	4,389.41										
106	Coniferous bog	581.72	Moderate to Severe	Change in vegetation												
114	Coniferous bog	7.911	Moderate to Severe	Change in vegetation												
406	Coniferous bog	26.125	Moderate to Severe	Change in vegetation												
48	Coniferous bog	14.142	Moderate to Severe	Change in vegetation												
552	Coniferous bog	31.738	Moderate to Severe	Change in vegetation												
559	Coniferous bog	229.834	Moderate to Severe	Change in vegetation												
562	Coniferous bog	56.744	Moderate to Severe	Change in vegetation												
564	Coniferous bog	38.575	Moderate to Severe	Change in vegetation												
62	Coniferous bog	20.018	Moderate to Severe	Change in vegetation												
714	Coniferous bog	1692.646	Moderate to Severe	Change in vegetation												
773	Coniferous bog	33.98	Moderate to Severe	Change in vegetation												
774	Coniferous bog	88.486	Moderate to Severe	Change in vegetation												
84	Coniferous bog	14.276	Moderate to Severe	Change in vegetation												
84A	Coniferous bog	55.627	Moderate to Severe	Change in vegetation												
88	Coniferous bog	6.396	Moderate to Severe	Change in vegetation												
887	Coniferous bog	1359.301	Moderate to Severe	Change in vegetation												
888	Coniferous bog	1123.789	Moderate to Severe	Change in vegetation												
90	Coniferous bog	685.002	Moderate to Severe	Change in vegetation												
98	Coniferous bog	24.18	Moderate to Severe	Change in vegetation												
984	Coniferous bog	162.094	Moderate to Severe	Change in vegetation												
105	Coniferous bog	62.495	Moderate to Severe	Change in vegetation												
11	Coniferous bog	95.587	Moderate to Severe	Change in vegetation												
479	Coniferous bog	157.954	Moderate to Severe	Change in vegetation												
558	Coniferous bog	50.111	Moderate to Severe	Change in vegetation												
697	Coniferous bog	48.894	Moderate to Severe	Change in vegetation												
699	Coniferous bog	23.74	Moderate to Severe	Change in vegetation												
713	Coniferous bog	80.451	Moderate to Severe	Change in vegetation												
782	Coniferous bog	10.815	Moderate to Severe	Change in vegetation												
783	Coniferous bog	20.604	Moderate to Severe	Change in vegetation												
949	Coniferous bog	19.484	Moderate to Severe	Change in vegetation												
	Subtotal Coniferous bog	**6,822.72**			2,265.70	4,617.52										
	Palustrine Scrub/Shrub Wetland	**12,862.81**			3,855.88	9,006.93	$1,378	$5,229	$5,313,403	$20,162,397	$1,493	$5,625	$13,447,345	$50,663,976	**$18,760,748**	**$70,826,372**
53B	Coniferous swamp	4.63	Moderate	Minor vegetation change												
53C	Coniferous swamp	2.28	Moderate	Minor vegetation change												
54.00	Coniferous swamp	44.11	Moderate	Minor vegetation change												
54A	Coniferous swamp	34.46	Moderate	Minor vegetation change												
54D	Coniferous swamp	17.55	Moderate	Minor vegetation change												
553.00	Coniferous swamp	27.41	Moderate	Minor vegetation change												
57.00	Coniferous swamp	293.94	Moderate	Minor vegetation change												
701.00	Coniferous swamp	1,643.00	Moderate	Minor vegetation change												
745.00	Coniferous swamp	143.48	Moderate	Minor vegetation change												
81.00	Coniferous swamp	13.51	Moderate	Minor vegetation change												
856.00	Coniferous swamp	29.50	Moderate	Minor vegetation change												
864.00	Coniferous swamp	1,005.13	Moderate	Minor vegetation change												
1,145.00	Coniferous swamp	30.31	Moderate	Minor vegetation change												
464.00	Coniferous swamp	137.65	Moderate	Minor vegetation change												
53A	Coniferous swamp	25.26	Moderate	Minor vegetation change												
53E	Coniferous swamp	20.09	Moderate	Minor vegetation change												
554.00	Coniferous swamp	23.21	Moderate	Minor vegetation change												
891.00	Coniferous swamp	74.82	Moderate	Minor vegetation change												
	Subtotal Coniferous swamp	**3,570.32**			894.00	2,676.32										
	Palustrine Forested Wetland	**3570.32**			894.00	2,676.32	$1,354	$5,208	$1,210,476	$4,655,952	$1,469	$5,604	$3,931,516	$14,998,393	**$5,141,992**	**$19,654,055**
TOTAL		**16,808.03**			**5,124.78**	**11,683.25**			**7,088,478.04**	**26,919,288.12**			**17,378,860.55**	**65,662,078.51**	**$24,467,339**	**$92,581,367**

Table 6. Zone 4 Impacts and Values (2,000 feet -5,000 feet)

UNIQUE ID	ID COWERS & REED CLASS	ACRES IMPACT	IMPACT	DESCRIPTION	Riparian Area - Acres	Non-Riparian Area - Acres	Riparian Areas - Values (Table 12) - Pg. 62- Low ($/acre/year)	Riparian Areas - Values (Table 12) - Pg. 62- High ($/acre/year)	Riparian Acres - Calculated Low Value ($/year)	Riparian Acres - Calculated High Value ($/year)	Non- Riparian Areas - Values (Table 12) - Pg. 62- Low ($/acre/year)	Non- Riparian Areas - Values (Table 12) - Pg. 62 - High ($/acre/year)	Non- Riparian Acres - Calculated Low Value ($/year)	Non- Riparian Acres - Calculated High Value ($/year)	TOTAL ACRES - Calculated Low Value ($/year)	TOTAL ACRES - Calculated High Value ($/year)
	Open water	**0**			0	0	$27,642	$72,513	$0	$0					$0	$0
NWI	Black Spruce Forest - Undetermined	**778.14**	Moderate	Change in vegetation	0.00	778.14										
	Evergreen Forest	**778.14**			0	778.14	$665	$4,040	$0	$0	$1,710	$2,776	$1,330,619	$2,160,117	**$1,330,619**	**$2,160,117**
889	Shallow marsh	3.279	None	None												
17	Shallow marsh	12.072	None	None												
1	Shallow marsh	4.56	None	None												
3	Shallow marsh	3.808	None	None												
6	Shallow marsh	6.654	None	None												
29	Shallow marsh	126.876	None	None												
708	Shallow marsh	42.189	None	None												
709	Shallow marsh	18.496	None	None												
	Subtotal Shallow marsh	**217.934**			60.70	157.23										
	Palustrine Emergent Wetland	**217.934**			60.7	157.234	$1,506	$5,604	$91,414	$340,163	$1,471	$5,603	$231,291	$880,982	**$322,705**	**$1,221,145**
752	Alder thicket	36.908	None	None												
530	Alder thicket	1283.309	None	None												
55	Alder thicket	15.732	None	None												
58	Alder thicket	235.493	None	None												
678	Alder thicket	1.676	None	None												
743	Alder thicket	4.75	None	None												
744	Alder thicket	10.344	None	None												
746	Alder thicket	3.572	None	None												
747	Alder thicket	10.027	None	None												
749	Alder thicket	99.326	None	None												
83	Alder thicket	130.786	None	None												
	Subtotal Alder thicket	**1,831.923**														
480	Alder thicket or Shrub-carr	47.863	None to Moderate	None to vegetation change												
555	Alder thicket or Shrub-carr	61.723	None to Moderate	None to vegetation change												
557	Alder thicket or Shrub-carr	31.464	None to Moderate	None to vegetation change												
566	Alder thicket or Shrub-carr	35.777	None to Moderate	None to vegetation change												
690	Alder thicket or Shrub-carr	157.349	None to Moderate	None to vegetation change												
315	Alder thicket or Shrub-carr	1256.836	None to Moderate	None to vegetation change												
	Subtotal Alder thicket or Shrub-carr	**1591.012**														
	Subtotal Alder thicket or Alder thicket/Shrub-carr	**3,422.94**			2,540.10	882.84										
558	Coniferous bog	50.111	None	None												
84A	Coniferous bog	41.351	None	None												
11	Coniferous bog	95.587	None	None												
103	Coniferous bog	62.495	None	None												
90	Coniferous bog	230.686	None	None												
479	Coniferous bog	157.954	None	None												
559	Coniferous bog	228.822	None	None												
563	Coniferous bog	33.827	None	None												
697	Coniferous bog	48.894	None	None												
699	Coniferous bog	23.74	None	None												
713	Coniferous bog	80.451	None	None												
714	Coniferous bog	1002.456	None	None												
782	Coniferous bog	10.815	None	None												
783	Coniferous bog	20.604	None	None												
887	Coniferous bog	1128.525	None	None												
888	Coniferous bog	90.125	None	None												
949	Coniferous bog	19.484	None	None												
106	Coniferous bog	451.616	None	None												
	Subtotal Coniferous bog	**3777.543**			1,385.00	2,392.54										
599	Open bog	23.039	None	None												
85	Open bog	16.555	None	None												
83	Open bog	26.414	None	None												
885	Open bog	950.076	None	None												
	Subtotal Open bog	**1016.084**			0.00	1,016.08										
	Palustrine Scrub/Shrub Wetland	**8,216.56**			3,925.10	4,291.46	$1,378	$5,229	$5,408,788	$20,524,348	$1,493	$5,625	$6,407,193	$24,139,474	**$11,815,941**	**$44,663,822**
54A	Coniferous swamp	16.573	None to Moderate	None to minor vegetation change												
57	Coniferous swamp	20.917	None to Moderate	None to minor vegetation change												
404	Coniferous swamp	137.651	None to Moderate	None to minor vegetation change												
553	Coniferous swamp	18.531	None to Moderate	None to minor vegetation change												
554	Coniferous swamp	23.212	None to Moderate	None to minor vegetation change												
701	Coniferous swamp	852.23	None to Moderate	None to minor vegetation change												
745	Coniferous swamp	82.463	None to Moderate	None to minor vegetation change												
55A	Coniferous swamp	25.257	None to Moderate	None to minor vegetation change												
891	Coniferous swamp	74.816	None to Moderate	None to minor vegetation change												
894	Coniferous swamp	901.932	None to Moderate	None to minor vegetation change												
1145	Coniferous swamp	30.313	None to Moderate	None to minor vegetation change												
53E	Coniferous swamp	20.088	None to Moderate	None to minor vegetation change												
	Subtotal Coniferous swamp	**2203.983**			852.20	1,351.78										
	Palustrine Forested Wetland	**2,203.98**			852.20	1,351.78	$1,354	$5,208	$1,153,879	$4,438,258	$1,469	$5,604	$1,985,769	$7,575,392	**$3,139,648**	**$12,013,650**
TOTAL		**11,416.62**			**4,838.00**	**6,578.62**			**6,654,080.80**	**25,302,768.30**			**9,954,832.61**	**34,755,964.42**	**16,608,913.41**	**60,058,732.72**

Table 7. Direct Wetland Values - Carbon

UNIQUE ID	ID EGGERS & REED CLASS	ACRES IMPACT	IMPACT	Riparian Area - Acres	Non-Riparian Area - Acres	TOTAL Acres Impact	Cabon Storage Table 13 - Pg. 64 - Low Value ($/acre)	Cabon Storage Table 13 - Pg. 64 - High Value ($/acre)	Carbon Storage - Calculated Low Value	Carbon Storage - Calculated High Value
	Open water	**0**		0	0	**0**				
	Evergreen Forest	**0**		0	0	**0**	$5,334	$25,153	$ -	$ -
	Deep marsh	**73.10**	Wetland eliminated	0.00	73.10	**73.10**				
	Shallow marsh	**73.10**	Wetland eliminated	0.00	73.10	**73.10**				
	Sedge Medow	**36.55**	Wetland eliminated	0.00	36.55	**36.55**				
	Palustrine Emergent Wetland	**182.76**		-	182.76	**182.76**	$1,152	$8,064	$ 210,539.52	$ 1,473,776.64
	Alder thicket or Shrub-carr	**118.79**	Wetland eliminated	0.00	118.79	**118.79**				
	Coniferous bog	**511.73**	Wetland eliminated	0.00	511.73	**511.73**				
	Open bog	**9.14**	Wetland eliminated	0.00	9.14	**9.14**				
	Palustrine Scrub/Shrub Wetland	**639.66**		-	639.66	**639.66**	$38,425	$55,661	$ 24,578,935.50	$ 35,604,115.26
	Coniferous swamp	**82.24**	Wetland eliminated	0.00	82.24	**82.24**				
	Hardwood swamp	**9.14**	Wetland eliminated	0.00	9.14	**9.14**				
	Palustrine Forested Wetland	**91.38**		0.00	91.38	**91.38**	$60,187	$83,048	$ 5,499,888.06	$ 7,588,926.24
TOTAL		**913.80**		-	**913.80**	**913.80**			**30,289,363.08**	**44,666,818.14**